REMARKS/ARGUMENTS

The Office Action mailed October 1, 2003 has been reviewed and carefully considered. Claims 5 and 8 are pending in this application, with claim 5 being the only independent claim. Reconsideration of the above-identified application in view of the following remarks, is respectfully requested.

In the Office Action mailed October 1, 2003, claims 5 and 8 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 5,988,259 (Welker).

Before discussing the cited prior art and the Examiner's rejections of the claims in view of that art, a brief summary of the present invention is appropriate. The present invention is directed to a method for determining and controlling the material flow of continuous cast slabs in a transport path between a continuous-casting installation and a rolling mill by monitoring and optimizing the temperature profile and the amount of heat of a continuous cast slab on the transport path.

The determination of the temperature profile and the amount of heat starts from knowledge of the temperature of the liquid phase at the mold exit of the continuous casting installation and physical parameters of the slab (page 3, lines 5-10). The physical parameters are preferably the temperature dependent material values density ρ, the specific heat C_ρ, the thermal conductivity λ, and scale properties (see page 5, lines 16-19). The convective mixing of the amount of heat contained in the slab and time dependent heat loss from the inhomogeneously cooling slab to the surrounding medium is then calculated using a mathematical-physical model which uses the temperature of the liquid phase at the mold exit and the physical parameters of the slab as inputs (see page 3, lines 10-14). A two-dimensional finite element method may be used to calculate the mathematical-physical model (page 4, lines 5-8). The result of the calculation and the measured

surface temperature of the slab are then used to control the material flow in an existing slab-monitoring system (see page 3, lines 14-17).

The present invention teaches that through evaluation of the profiles of the means slab temperature and selected surfaces temperatures over time, it is subsequently possible to estimate the mean slab temperature by measuring the surface temperature (page 6, lines 3-6).

Independent claim 5 recites determining a temperature of the liquid phase of the continuous cast slab at a mold exit, determining physical parameters of the continuous cast slab, and measuring a surface temperature of the continuous cast slab over time during the material flow of the continuous-cast slab. Furthermore, independent claim 5 recites determining an amount of heat and a temperature profile of the continuous-cast slab over time by calculating the convective mixing of the amount of heat contained in the continuous-cast slab and the time-dependent heat loss from the inhomogeneous cooling of the continuous cast slab, wherein the calculations use one of a two-dimensional finite element method, a finite difference method, and software using formulas derived from off-line studies.

Welker discloses a method and an apparatus for controlling the cooling of a strand in a continuous casting installation. According to Welker, a temperature distribution in the strand is constantly calculated in real time depending on the quantity of cooling agent and/or the manner of application of the cooling agent. The calculated temperature distribution is compared to a desired value and the required quantity and or manner of application of the cooling agent is determined iteratively until a deviation of a temperature calculated using the model is within a tolerance value of the desired temperature distribution (see col. 2, lines 19-29). As a starting point for the temperature distribution, it is assumed that the temperature of the strand upon entry into the mold has the melting temperature of steel (see col. 4, lines 31-34). Accordingly, Welker discloses a

model for cooling of the strand. Welker fails to disclose step b. of independent claim 5 which recites measuring a surface temperature of the continuous cast slab. Rather, Welker discloses that the cooling model is used to calculate the temperature distribution in the strand and to determine the proper cooling parameters to reach a desired temperature distribution. Furthermore, Welker fails to disclose the use of one of a two-dimensional finite element method, a finite difference method, and software using formulas derived from off-line studies. In contrast, Welker discloses the use of an iterative determination of target quantity of a cooling agent.

Lastly, independent claim 5 also recites that the material flow is controlled based on the measured surface temperature, the calculated temperature profile, and the calculated amount of heat. In contrast, Welker merely discloses control of the quantity of cooling medium and/or the manner of application of the cooling medium.

In view of the all of the above comments, it is respectfully submitted that independent claim 5 is not anticipated by Welker under 35 U.S.C. §102.

Since Welker uses only a cooling model to determine the temperature distribution, Welker teaches away from measuring a surface temperature. Furthermore, Welker teaches only control of cooling means and fails to teach or suggest controlling material flow. Accordingly, it is respectfully submitted that independent claim 5 is also not obvious over Welker under 35 U.S.C. §103.

Dependent claim 8, being dependent on independent claim 5, is deemed allowable for the same reasons expressed above with respect to independent claim 5.

The application is now deemed to be in condition for allowance and notice to that effect is solicited.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

COHEN, PONTANI, LIEBERMAN & PAVANE

By _____

Alfred W. Froebrich
Reg. No. 38,887
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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